BMS Mathematics Academic Team Practice Test (Sample)

Study Guide

BY EXAMZIFY

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Questions

1. **What is 15% of 200?**

   A. 20

   B. 30

   C. 40

   D. 50

2. **If the length of each side of a triangle is doubled, how many times greater will the perimeter be?**

   A. One

   B. Two

   C. Three

   D. Four

3. **For the equation Y = 2|X - 3| + 4, what is the y-intercept?**

   A. (0, 8)

   B. (0, 10)

   C. (0, 6)

   D. (0, 4)

4. **If f(x) = 3x² + 2, what is f(2)?**

   A. 10

   B. 14

   C. 16

   D. 18

5. **When multiplying two fractions together, what is the first step?**

   A. Finding a common denominator

   B. Multiplying the numerators

   C. Adding the fractions

   D. Finding the least common multiple

6. In a scenario with five numbers, if the mode is 3, what does this imply about the frequency of the numbers?

   A. The number 3 occurs most frequently.

   B. The number 5 occurs most frequently.

   C. All numbers occur with equal frequency.

   D. No mode exists in the set.

7. What is the first step in factoring the quadratic expression $x^2 - 7x - 18$?

   A. Identifying the coefficients a, b, and c

   B. Calculating the roots using the quadratic formula

   C. Rearranging the expression into standard form

   D. Finding the greatest common factor

8. Which expression results from multiplying (x - 9) and (x + 2)?

   A. $x^2 + 7x - 18$

   B. $x^2 - 7x - 18$

   C. $x^2 - 11x + 18$

   D. $x^2 + 11x - 18$

9. In a right triangle, if one angle is 30°, what is the measure of the other non-right angle?

   A. 30°

   B. 45°

   C. 60°

   D. 90°

10. In similar triangles ABC and DEF, if side AB measures 6 cm and side DE measures 3 cm, how long is side BC if side EF measures 7 cm?

   A. 10 centimeters

   B. 12 centimeters

   C. 14 centimeters

   D. 16 centimeters

Answers

1. B
2. B
3. B
4. B
5. B
6. A
7. A
8. B
9. C
10. C

Explanations

1. What is 15% of 200?

A. 20

B. 30

C. 40

D. 50

To find 15% of 200, start by expressing 15% as a decimal. This is done by dividing 15 by 100, which gives you 0.15. Next, multiply this decimal by 200 to find the amount that represents 15% of the total. So the calculation looks like this: $0.15 \times 200 = 30$. This shows that 15% of 200 is indeed 30. Therefore, the correct choice accurately represents the result of this multiplication. Understanding how to convert percentages to decimals and applying them in calculations is a fundamental skill in mathematics, especially when dealing with percentages in various contexts.

2. If the length of each side of a triangle is doubled, how many times greater will the perimeter be?

A. One

B. Two

C. Three

D. Four

To determine how many times greater the perimeter of a triangle becomes when the length of each side is doubled, we start by understanding the formula for the perimeter of a triangle. The perimeter (P) is the sum of the lengths of all three sides.   Let's say the original lengths of the sides of the triangle are (a), (b), and (c). The original perimeter (P) can be expressed as: $[P = a + b + c]$ If we double the length of each side, the new lengths will be $(2a)$, $(2b)$, and $(2c)$. The new perimeter (P_{new}) is calculated as follows: $[P_{\text{new}} = 2a + 2b + 2c]$ We can factor out the 2 from the equation: $[P_{\text{new}} = 2(a + b + c) = 2P]$ This indicates that the new perimeter is twice the original perimeter. Therefore, when the lengths of all sides of a triangle are doubled, the perimeter increases by a factor of two. Thus, the answer to how many times greater

3. For the equation Y = 2|X - 3| + 4, what is the y-intercept?

A. (0, 8)

B. (0, 10)

C. (0, 6)

D. (0, 4)

To determine the y-intercept of the equation Y = 2|X - 3| + 4, we need to evaluate the function when X is equal to 0. The y-intercept is defined as the point where the graph of the equation crosses the y-axis, which occurs when the value of X is zero. Substituting X = 0 into the equation, we get: Y = 2|0 - 3| + 4. Calculating the absolute value, we find: |0 - 3| = |-3| = 3. Now we can substitute that back into the equation: Y = 2(3) + 4, Y = 6 + 4, Y = 10. Thus, the y-intercept is the point (0, 10). This indicates when X is 0, Y equals 10, confirming that the correct answer matches the coordinates given in the choice. This approach shows how substituting the X value into the equation directly leads to the correct identification of the y-intercept.

4. If f(x) = 3x² + 2, what is f(2)?

A. 10

B. 14

C. 16

D. 18

To find \(f(2) \) when given the function \(f(x) = 3x^2 + 2 \), you substitute \(2 \) into the function in place of \(x \). First, calculate \(3 \times (2)^2 \): \[(2)^2 = 4 \] \[3 \times 4 = 12 \] Next, add \(2 \) to this result: \[12 + 2 = 14 \] Thus, \(f(2) = 14 \). This shows that the function evaluated at \(x = 2 \) yields a value of \(14 \). Therefore, the correct answer is the one that corresponds to this calculation.

5. When multiplying two fractions together, what is the first step?

A. Finding a common denominator

B. Multiplying the numerators

C. Adding the fractions

D. Finding the least common multiple

When multiplying two fractions, the first and essential step is to multiply the numerators together. This involves taking the numerator of the first fraction and multiplying it by the numerator of the second fraction. This step is crucial because it sets the stage for determining the product of the fractions.   After multiplying the numerators, the next step would involve multiplying the denominators, resulting in a new fraction formed by the product of both numerators over the product of both denominators. Finding a common denominator, adding the fractions, or determining the least common multiple are all techniques related to operations with fractions, but they do not apply to the multiplication of fractions. Multiplication doesn't require finding common denominators or adding, making the multiplication of the numerators the clear and correct first step.

6. In a scenario with five numbers, if the mode is 3, what does this imply about the frequency of the numbers?

A. The number 3 occurs most frequently.

B. The number 5 occurs most frequently.

C. All numbers occur with equal frequency.

D. No mode exists in the set.

The mode of a set of numbers is defined as the value that appears most frequently within that set. When it is stated that the mode is 3, this directly implies that the number 3 occurs more often than any other number in the set. In terms of frequency, this means there are more instances of the number 3 than any other value present in the group of five numbers. If there were another number that occurred with the same highest frequency as 3, the set would have more than one mode, which is not indicated in this scenario. Therefore, the designation of 3 as the mode confirms its prominence in frequency compared to all other numbers in the set. The other options either misrepresent the frequency of the numbers or imply an absence of a mode, which contradicts the provided information that the mode is specifically 3.

7. What is the first step in factoring the quadratic expression $x^2 - 7x - 18$?

A. Identifying the coefficients a, b, and c

B. Calculating the roots using the quadratic formula

C. Rearranging the expression into standard form

D. Finding the greatest common factor

The first step in factoring the quadratic expression $x^2 - 7x - 18$ involves identifying the coefficients a, b, and c. In the context of a quadratic expression in the form $ax^2 + bx + c$, a represents the coefficient of x^2, b is the coefficient of x, and c is the constant term. For this expression, $a = 1$, $b = -7$, and $c = -18$. By recognizing these coefficients, you can determine the necessary components for factoring or applying the quadratic formula if required later in the process. This step is essential because it simplifies the process of finding numbers that will work for factoring, specifically looking for two numbers that multiply to ac (where $a = 1$ and $c = -18$, thus the product is -18) and add up to $b = -7$. Calculating the roots using the quadratic formula is a method used after identifying the coefficients, so it's not the initial step. Rearranging the expression isn't necessary here, as it is already

8. Which expression results from multiplying (x - 9) and (x + 2)?

A. $x^2 + 7x - 18$

B. $x^2 - 7x - 18$

C. $x^2 - 11x + 18$

D. $x^2 + 11x - 18$

To determine which expression results from multiplying $(x - 9)$ and $(x + 2)$, we can apply the distributive property, also known as the FOIL method for binomials, which stands for First, Outside, Inside, Last. 1. **First**: Multiply the first terms in each binomial: $$ x \cdot x = x^2 $$ 2. **Outside**: Multiply the outside terms: $$ x \cdot 2 = 2x $$ 3. **Inside**: Multiply the inside terms: $$ -9 \cdot x = -9x $$ 4. **Last**: Multiply the last terms in each binomial: $$ -9 \cdot 2 = -18 $$ Now, we combine all these results: $$ x^2 + 2x - 9x - 18 $$ Next, simplify by combining like terms: $$ x^2 + (2x - 9x) - 18 = x^2 - 7x - 18 $$ Thus, the

9. In a right triangle, if one angle is 30°, what is the measure of the other non-right angle?

A. 30°

B. 45°

C. 60°

D. 90°

In a right triangle, the sum of all interior angles is always 180°. One of these angles is the right angle, measuring 90°. Given that one angle is 30°, we can determine the measure of the other non-right angle by using the angle sum property. First, we know that: $$\text{Sum of angles} = 180°$$ Since one angle is already a right angle at 90° and another is 30°, we can set up the equation: $$90° + 30° + \text{Other angle} = 180°$$ This simplifies to: $$120° + \text{Other angle} = 180°$$ To find the measure of the other angle, we subtract 120° from 180°: $$\text{Other angle} = 180° - 120° = 60°$$ Thus, the measure of the other non-right angle in the triangle is 60°, making this the correct answer. The measure of the other angle cannot be 30° or 45°, as this would violate the rule that the sum of the angles must equal 180° in a triangle. Additionally, 90° represents

10. In similar triangles ABC and DEF, if side AB measures 6 cm and side DE measures 3 cm, how long is side BC if side EF measures 7 cm?

A. 10 centimeters

B. 12 centimeters

C. 14 centimeters

D. 16 centimeters

To find the length of side BC given the lengths of sides AB and DE along with side EF, we can utilize the property of similar triangles which states that the ratios of corresponding sides are equal. First, establish the ratio of the sides given. Since triangles ABC and DEF are similar, we can write the ratio of the sides like this: $$\frac{AB}{DE} = \frac{BC}{EF}$$ Substituting the known values: $$\frac{6 \text{ cm}}{3 \text{ cm}} = \frac{BC}{7 \text{ cm}}$$ From the left side, we simplify the ratio: $$\frac{6}{3} = 2$$ This tells us that for every 2 cm in triangle ABC, there is 1 cm in triangle DEF. Therefore, we have: $$2 = \frac{BC}{7}$$ To find BC, we can cross-multiply: $$BC = 2 \cdot 7$$ Calculating that gives: $$BC = 14 \text{ cm}$$ Thus, the length of side BC is 14 centimeters. Understanding the properties of similar